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UTILIZING DOCUMENT WHITE SPACE
TO PERSISTENTLY DISPLAY DESIGNATED CONTENT

5

BACKGROUND OF THE INVENTION

Field of the Invention

10   The present invention relates to an improved data
processing system, and more specifically, to a system,
method, and program for utilizing the white space or
background space of a document to persistently display
designated content.

15   Description of the Related Art

        As computational devices continue to proliferate
throughout the world, there also continues to be an increase
in the use of networks connecting these devices. A widely
used network is the Internet which is a collection of
20 networks, possibly dissimilar, that are joined together by
means of gateways that handle data transfer and the
conversion of messages from the sending network to the
protocols used by the receiving network. A commonly
employed method of transferring data over the Internet is to
25 employ the World Wide Web (WWW) environment, referred to
herein as the "Web". In the Web environment, servers and

clients effect data transfer using the Hypertext Transfer Protocol (HTTP), a known protocol for handling the transfer of various data files (e.g., text, still graphic images, audio, motion video, etc.).

5   A Web browser on a client enables a user to specify a Web location through a displayed link or by inputting the URL of the location in the browser. The Web browser sends the URL request using the HTTP protocol to the Internet which determines which server to send the request to. A Web

10 server receives the request and sends the requested page to the Web browser client for display to the user.

      A page is created using a markup language such as hypertext markup language (HTML), extended hypertext markup language (XML), or wireless markup language (WML). Portions

15 of text and images within a page are delimited by indicators, which affect the format for display. In HTML documents, the indicators are referred to as tags. These markup languages generate a flowing text document in contrast to a fixed page layout such as is generated by an

20 Adobe PDF document or documents using other fixed positioning layouts.

      The Document Object Model (DOM) is a platform and language independent interface that allows programs and scripts to dynamically access and update the content,

25 structure, and style of documents. The Document Object Model is a W3C standard for which information on the World Wide Web can be found at W3.org/DOM. The Document Object Model essentially breaks down the anatomy of a Web page into components that can be manipulated. The Document Object

30 Model expresses the structure of an HTML document in a

universal, content-neutral way. The DOM creates objects
which have child objects and properties. The child objects
have further child objects and properties and so on.
Basically, the DOM is a hierarchical structure consisting of
5 a top/down list from left to right of all of the elements of
a Web page or document displayed on the screen. Some top
level objects include:

    window
10   location
        frames
        history
        navigator
        event
15   screen
        document
            links
            anchors
            images
20   filters
            forms
            applets
            plug-ins
            frames
25   scripts
            stylesheets
            body

When a Web browser brings down a Web page, the Web page
is parsed into a tree. When the browser renders the
30 document, the browser will go left-to-right and top-down on

the tree and render each element that is in the DOM.
Essentially, the DOM is a rendering tree. Since there is an
API to the DOM, programming script, such as Java Script, can
traverse the tree, modify the tree, and move a graphical

5 image from one element of the tree to another element of the
tree. For example, the Document Object Model enables
programming script to specify an image at a location, text
at a location, a frame, text within a frame, an image within
a frame, etc. The browser then reflows the document

10 (top-down, left-to-right) according to the changes made to
the DOM tree as the reflowed document is rendered to the
display.

A Web page can include text and other objects including
image, video, and audio. A Web page can include embedded

15 object sources, such as an image source having graphics,
audio, video, and/or text, that are specified by a link to
other Web content on the Internet. When a Web browser
renders the requested Web page having an embedded object,
the Web browser sends a request to the server specified by

20 the embedded link to get the content of the embedded object.
When the Web browser receives the content, the Web browser
renders the embedded object content as part of the Web page
as defined in the markup language.

In other scenarios, the Web browser may display the Web

25 content of the embedded object in a browser object such as
another window or a frame. Browser objects are generated by
the Web browser either in response to directions in the
markup language of a requested page being rendered, or they
can be generated by the browser independent from and

30 separate from any specific Web page. In the latter case,

content contained within the browser object originates outside the scope of the primary underlying Web page being displayed in response to a client request. Browser objects may include frames, or windows, or other objects such as

5 other images that appear as icons. In essence though, all browser objects can be thought of in a similar way as separate browser frames or browser windows having content defined by a Web page. However, these browser objects and their "Web page" content can be considered to be secondary

10 to the primary Web page being displayed in response to a client request. Typically, the "Web page" content of a browser object has not been specifically requested by the viewing client. Instead, for example, it can be displayed in response to operations stemming from an underlying

15 Internet Service Provider to the client. A typical example of such secondary Web page content appearing in a browser object is advertising.

Since access to many Web pages is free to a user without having to subscribe to the Web site and pay a fee,

20 many Web site owners try to compensate for their expenses by embedding one or more links within their Web page to advertisements. In addition, Internet Service Providers also try to minimize the cost of providing access to the Internet to its users by displaying advertising to the users

25 using browser objects.

Several different types of problems occur depending upon whether the content, such as advertising content, is being provided for by a Web page designer, or the content is utilizing a browser object.

One problem arises when a Web page designer may have allocated too much space in the Web page for a specific advertisement retrieved by the Web browser through an embedded link. For example, Fig. 1 illustrates a Web page
5 100 wherein the advertisement 101 does not fully utilize the background space 102 that the Web page designer had allocated for it. Consequently, the full potential impact of the advertisement is minimized by not utilizing the full area that has been allocated to it. Also, as shown in Fig.
10 1, it should be noted that the advertisement 101 is at the top of the Web page 100.

The use of advertising on the Internet has become annoying to many users. The problem is not only that the advertising is becoming ubiquitous, but the problem also
15 arises due to the manner in which specific advertising is presented on the user's display.

An annoyed user viewing the Web page of Fig. 1 would merely scroll the Web page such that the advertisement at the top of the screen would then scroll off of the screen.
20 Consequently, the full potential impact of the advertisement is further not realized because it has been placed in a way that allows the advertisement to be scrolled off of the screen.

To avoid having a user scroll an advertisement off the
25 screen, some Web page designers direct the Web browser to generate new frames, i.e., browser objects, for the advertisements. The location of the frames on the display screen is under the control of the Web browser, and not necessarily under the control of the designer of the primary
30 Web page. As such, the frames may appear on the display

screen in a way that obfuscates a part of the primary Web
page that the user was interested in viewing. Although an
action by the user on the primary Web page may cause the
advertising frame to disappear, other frames may continue to
5 reappear while a user is viewing a particular Web page. It
is annoying to users to have these advertising frames or
other browser objects popping onto the display screen. In
some instances, the frames do not disappear from the screen
unless the user makes an additional user interaction to
10 specifically close the particular frame, resize it, or move
it. This additional user interaction becomes even more
annoying when it has to be repeated for each different frame
that seems to continually pop into view.

   This problem exists not just for advertisements, but
15 for any browser object that appears or reappears on the
display screen regardless of the user interaction with the
underlying primary Web page.

   For example, at a Web site on the World Wide Web at
storenet.com, there is a browser object that keeps
20 appearing on the screen regardless of how the Web page is
scrolled or the Web page window is resized. The problem is
that this browser object obscures some of the content of the
Web page.

25

SUMMARY OF THE INVENTION

   It is therefore an object of the invention to enhance
30 the advertising environment on the Internet by minimizing

the annoying aspects of having advertisements appear on the display screen in a way that obscures portions of the content of the underlying primary Web page.

It is a further object of the present invention to

5 avoid obscuring underlying content when a browser object pops on top of the primary Web page.

It is a further object of the invention to enable advertising content to appear on the display screen in a way that fully utilizes any white space or background space of

10 the primary underlying Web page content.

It is a further object of the invention to enable designated content to be persistently displayed in a way that does not obfuscate any portion of the content of a primary document being viewed.

15

The system, method and program of the invention enables a Web browser or viewer program to identify the white space, i.e., background space, of a document; and to utilize the identified white space for displaying content that has been

20 designated as content that is to be persistently displayed regardless of user actions. Specifically, a Web browser examines the primary Web page content for available white space having a size that will allow the designated content to fit within it. If no such white space is currently

25 available as the Web page is currently being painted in its displayed frame, the browser will reflow the underlying primary content to generate the appropriate size of white space for the designated content. The browser then renders the white space filler, i.e., the designated content, and

30 paints the display with the underlying primary Web page

content with the designated content embedded in the
previously available white space. If the underlying primary
Web page is scrolled, or its frame resized, such that the
designated content would no longer be fully visible, the
5 browser relocates the designated content to any
appropriately sized available new white space. If such new
white space does not currently exist, then the browser
reflows the underlying primary content to generate the
appropriately sized white space. This process continues to
10 be reiterated as needed.

BRIEF DESCRIPTION OF THE DRAWINGS
15

    For a more complete understanding of the present
invention and the advantages thereof, reference should be
made to the following Detailed Description taken in
connection with the accompanying drawings in which:
20   Fig. 1 illustrates a Web page having an advertisement
that incompletely fills available white space in accordance
with the prior art;
    Fig. 2 illustrates one embodiment of a computer system
with which the method, system, and program of the present
25 invention may be advantageously utilized;   and
    Fig. 3 illustrates the process flow and logic of a
preferred embodiment of the invention.

30   DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, reference is made to the accompanying drawings which form a part hereof, and which illustrate several embodiments of the present invention. It

5 is understood that other embodiments may be utilized and structural and operational changes may be made without departing from the scope of the present invention.

In the description herein the term white space is used although it is to be understood that the space may not

10 necessarily be white; it may be any color or pattern or image. Background space and white space are used interchangeably herein.

In addition, the use of the term "images" may include any embedded object such as scaleable vector graphics and

15 other content being rendered by another plug-in, such as Macromedia Flash.

Although a preferred embodiment of the invention is described below with reference to a Web browser and Web pages, the present invention is also applicable to other

20 viewer programs and documents. The terms "Web pages" and "documents" are used interchangeably herein. Although all Web pages can be considered as documents, not all documents are necessarily Web pages. The present invention is not limited to Web pages, but to any document while under the

25 control of a viewer program. Examples of Web browsers include Microsoft Internet Explorer and Netscape Navigator. An example of a viewer program is Adobe Acrobat Reader. The term viewer program when used more generally herein also includes browser programs. Likewise, the invention is

30 applicable to all viewer programs even though the term

browser program may have been used in describing a preferred
embodiment. A viewer program, including browser programs,
is a program that allows a file to be read, or played, but
not changed. Although a viewer program may enable the
5 display of the file to be altered or rearranged on the
display screen, it does not provide any capability for
editing the original source file of the document.

Although a preferred embodiment of the invention is
described with reference to advertising content, the
10 advantages of the invention are fully realized with other
types of content including logos, watermarks, stock quotes,
personal financial updates, weather and news updates, or
other important notes or reminders that are desired to be
continually displayed. All of these types of content are
15 referred to herein as secondary content. Secondary content
is content that has not been specifically requested by a
user for viewing; or, if it has been requested, it is in
addition to, or secondary to, primary content that the user
has requested. It is this secondary content that is enabled
20 to be persistently displayed, in accordance with a preferred
embodiment of the invention, regardless of user interactions
such as scrolling or frame resizing. The term "underlying
primary content" is used herein to mean the content of the
main document that was originally requested by the user to
25 be displayed.

The present invention may be executed in a variety of
systems, or network of systems, including a variety of
computing systems and electronic devices under a number of
different operating systems and networks. In one embodiment
30 of the present invention, the computing system is a portable

computing system such as a notebook computer, a palmtop
computer, a personal digital assistant, a telephone or other
electronic computing system that may also incorporate
communications features that provide for telephony, enhanced
5 telephony, messaging and information services. However, the
computing system may also be, for example, a desktop
computer, a network computer, a midrange computer, a server
system or a mainframe computer. Therefore, in general, the
present invention is preferably executed in a computer
10 system that performs computing tasks such as manipulating
data in storage that is accessible to the computer system.
In addition, the computer system preferably includes at
least one output device and at least one input device.

   Referring now to the drawings, and in particular to
15 Fig. 2, there is depicted one embodiment of a computer
system with which the method, system, and program of the
present invention may be advantageously utilized. Computer
system 10 comprises a bus 22 or other communication device
for communicating information within computer system 10, and
20 at least one processing device such as processor 12, coupled
to bus 22 for processing information. Bus 22 preferably
includes low-latency and high-latency paths that are
connected by bridges and controlled within computer system
10 by multiple bus controllers.

25   Processor 12 may be a general-purpose processor such
as IBM's PowerPC™ processor that, during normal operation,
processes data under the control of operating system and
application software stored in a dynamic storage device such
as a random access memory (RAM) 14 and a static storage
30 device such as Read Only Memory (ROM) 16. The operating

system preferably provides a graphical user interface (GUI)
to the user. In a preferred embodiment, application
software, such as a browser program or a viewer program,
contains machine executable instructions that when executed
5 on processor 12 carry out the operations depicted in the
flowcharts described herein. Alternatively, the steps of
the present invention might be performed by specific
hardware components that contain hardwire logic for
performing the steps, or by any combination of programmed
10 computer components and custom hardware components.

     Further, multiple peripheral components may be added to
computer system 10. For example, a display 24 is also
attached to bus 22 for providing visual, tactile or other
graphical representation formats. Audio output through a
15 speaker or other audio projection device may be controlled
by audio output device 28 attached to bus 22. A keyboard 26
and cursor control device 30, such as a mouse, track ball,
or cursor direction keys, are coupled to bus 22 as
interfaces for user inputs to computer system 10. It should
20 be understood that keyboard 26 and cursor control device 30
are examples of multiple types of input devices that may be
utilized in the present invention. In alternate embodiments
of the present invention, additional input and output
peripheral components may be added.

25   The present invention may be provided as a computer
program product, included on a machine-readable medium
having stored thereon the machine executable instructions
used to program computer system 10 to perform a process
according to the present invention. The term
30 "machine-readable-medium" as used herein includes any medium

that participates in providing instructions to processor 12
or other components of computer system 10 for execution.
Such a medium may take many forms including, but not limited
to, nonvolatile media, volatile media, and transmission

5   media. Common forms of nonvolatile media include, for
example, a floppy disk, a flexible disk, a hard disk,
magnetic tape or any other magnetic medium, a compact disc
ROM (CD-ROM), a digital video disc-ROM (DVD-ROM) or any
other optical medium, punch cards or any other physical

10 medium with patterns of holes, a programmable ROM (PROM), an
erasable PROM (EPROM), electrically EPROM (EEPROM), a flash
memory, any other memory chip or cartridge, or any other
medium from which computer system 10 can read and which is
suitable for storing instructions. In the present

15 embodiment, an example of nonvolatile media is storage
device 18. Volatile media includes dynamic memory such as
RAM 14. Transmission media includes coaxial cables, copper
wire or fiber optics, including the wires that comprise bus
22. Transmission media can also take the form of acoustic

20 or light waves, such as those generated during radio wave or
infrared data communications.

        Moreover, the present invention may be downloaded as a
computer program product, wherein the program instructions
may be transferred from a remote computer such as server 39

25 to requesting computer system 10 by way of data signals
embodied in a carrier wave or other propagation medium via a
network link 34 (e.g., a modem or network connection) to a
communications interface 32 coupled to bus 22.
Communications interface 32 provides a two-way data

30 communications coupling to network link 34 that may be

connected, for example, to a local area network (LAN), wide

are network (WAN), or as depicted herein, directly to an

Internet Service Provider (ISP) 37. In particular, network

link 34 may provide wired and/or wireless network

5   communications to one or more networks.

ISP 37 in turn provides data communication services

through the Internet 38 or other network. Internet 38 may

refer to the worldwide collection of networks and gateways

that use a particular protocol, such as Transmission Control

10 Protocol (TCP) and Internet Protocol (IP), to communicate

with one another. ISP 37 and Internet 38 both use

electrical, electromagnetic, or optical signals that carry

digital or analog data streams. The signals through the

various networks and the signals on network link 34 and

15 through communications interface 32, which carry the digital

or analog data to and from computer system 10, are exemplary

forms of carrier waves transporting the information.

The system, method and program of a preferred

20 embodiment of the invention enables a Web browser or viewer

program to identify the white space, i.e., background space,

of a document; and to utilize the identified white space for

displaying content that has been designated as content that

is to be persistently displayed regardless of user actions.

25 It should be noted that the content itself may be so

designated, or an object, such as a browser object, that is

to contain content, may be so designated.

Referring back to Fig. 1, the system, method, and

program of the present invention identifies the white space

30 102 and utilizes the white space to either enlarge the

advertisement 101 such that it more fully utilizes the white space, or utilizes the white space for yet another advertisement or for other Web content of another embedded source object. As such, the browser at the client performs

5 automatic stretching and fitting of secondary content within embedded objects. This is especially beneficial when rendering secondary Web pages, created for a certain display resolution, on a display with a different display resolution, and displaying those images to scale.

10   Furthermore, the browser keeps the advertising content viewable on the underlying primary Web page without obscuring the underlying primary Web page content. In response to a user scrolling the primary Web page, the browser flows the primary Web page content around the

15 advertising content. That is, the primary Web page content flows around an embedded object such as an embedded object containing advertising content. Although it appears as though the embedded object is moving down through the text during a scrolling operation, the browser is flowing the

20 primary Web page content upward around the embedded object.

        Identifying the presence or absence of white space in a Web document can be carried out in many different ways. In one embodiment, a grid is set up for the picture elements (pixels or pels), wherein each pel within the displayed Web

25 page is defined by a set of coordinates. At each coordinate, a 1 (or, alternatively, a 0) is set if white space exists at a given coordinate. Alternatively, a value of 0 can be used if the pel is not used or if the value of the pel is consistent with a value being used for background

images, and a value of 1 can be used to indicate foreground content.

An additional method akin to this one would be to scale the pixel unit measurement into representing multiple pixels
5 to reduce the number of pixels to keep track of, thereby saving memory space.

Another technique for determining the white space is using the nearest neighbor technique in which the size of the white space is determined by counting the number of
10 points to the right of a previous white space point until the white space ends, and then traversing the row of white space points below the previous determined white space row and counting point after point of white space. This process continues until no more rows of white space exist. In
15 essence, such a process determines the form or size of white space, such as a rectangle or other shape. The size of the white space is then stored (e.g., 20 points by 30 points) which requires less memory than storing a grid of each pel and whether a bit for each specific pel is on or off to
20 represent its status as a white space. As such, the size and location of the white space is stored.

Another method uses the DOM interface to check the rectangles of a Web page. Calculations on various Web page data elements are performed before and after and during the
25 rendering process to determine the areas of the data elements that are used. The areas for all of the Web page data elements are stored. Any remaining areas are determined to be areas of white space or background space.

In utilizing the DOM interface in a preferred
30 embodiment of the invention, the document data elements

(objects) would be drawn in the Document Object Model (DOM).
When a browser brings down a primary Web page, the primary
Web page is parsed into a tree. When the browser renders
the primary Web page, the browser will go left-to-right and
5 top-down on the tree and render each data element (object)
that is in the DOM. Essentially, the DOM is a rendering
tree. Since there is an API to the DOM, programming script,
such as JAVA Script, can traverse the tree, modify the tree,
and move a graphical image from one element of the tree to
10 another element of the tree. For example, the Document
Object Model enables programming script, such as Java
script, to specify an image at location, text at location,
frame, text within frame, an image within frame, etc. The
browser would then reflow the document (top-down,
15 left-to-right) according to the changes made to the DOM
tree.

        The above described determinations for white space are
performed on a per simple frame basis. It is understood
that there can be frames within frames. In the present
20 invention, for simplicity, each frame is treated as a
separate Web page for purposes of its layout.

        Fig. 3 illustrates an overall process flow and logic of
a preferred embodiment of the invention. The process begins
at step 301 and proceeds to downloading content of a primary
25 Web page 302. For any of the above described methods for
determining white space, the storage marker used for
indicating the white space is cleared 304. The primary page
is then rendered 406 while utilizing one of the methods
described above, or other method, for determining white
30 space such as i) marking each pel as it is overlaid or

rendered 311, ii) computing the rendered shape and storing the area 312, or iii) computing the area and storing the area in DOM with the rendered object 313. The white space filler is then rendered 322. The filler may be an

5 advertisement, the weather, the time, stock quotes, watermarks, news or sports updates, personal finance information, or other information. The method then waits for the next paint command, 324, such as a user scroll action, frame resize, page down, etc. When such a user

10 action is received that would change the current display, the process repeats itself by rendering the white space filler in an appropriately sized white space area.

There are several embodiments of the present invention which utilize the available white space to reposition

15 secondary Web page content (or the associated object) such as an advertising frame, logos, watermarks, graphics, important news events, etc., within the primary Web page.

In one embodiment, the secondary content remains at a relatively fixed position within the primary frame of the

20 primary Web page document as the primary content is scrolled by repositioning the primary Web page content, i.e., the data elements, around the browser object containing the secondary content.

In another embodiment, the secondary Web page content

25 is repositioned in the primary Web page document as the primary Web page is scrolled by minimizing any change to the original overall layout of the primary document while maximizing the ability to show the secondary Web page content. In this embodiment, the browser finds white space

30 having a size that can accommodate the secondary Web page

content, and its associated object, and pops the secondary
Web page content into this area.

In addition, if a primary browser frame having a
rendered primary Web page is resized such that an embedded
5 secondary object would no longer be viewable within the
resized frame, a preferred embodiment of the invention will
relocate the embedded secondary object within the rendered
primary Web page. The prior art technique of popping up new
frames containing advertisement content which may obscure
10 portions of the primary Web page is no longer necessary.
Instead, the advertising content is repositioned within the
current frame containing the primary Web page. This is
possible because it is the browser that determines when a
primary frame is resized in such a way that a specific
15 browser object would no longer be viewable. As such, the
present invention ensures that certain objects, embedded in
the primary Web page and obscured because they have been
scrolled off the screen or because the Web page frame has
been resized, remain displayed.

20   Although a preferred embodiment comprises a viewer
program using flowed content, the present invention is also
applicable to viewer programs using fixed content. In such
embodiments, the viewer program would superimpose the
secondary content on the available fixed white space.
25 However, the viewer program would not be able to create any
white space. Nevertheless, if white space were not
available, the viewer program would display the secondary
content over the primary content for only a finite period of
time, or until white space was found in the displayed
30 portion of the document that could, at least partially

accommodate the secondary content. Even if the white space could not completely accommodate the secondary content, whatever portion it could accommodate would minimize the amount of primary content that would be obscured.

5   The creator of a Web page can designate that certain content, embedded objects or frames always remain viewable. The content owner (such as an advertiser owner) can also designate that any embedded object containing its content be always shown. In addition, the browser may generate its own

10 browser object to be always shown. It does not have to be a full frame window; it can be any graphic, document, section of text, section of links, etc.

The browser receives the designation of which embedded objects are to remain visible through the use of meta data

15 tags that are compatible with the Hypertext Markup Language as it exists today. Alternatively, new tags can be created for indicating that an object is to be treated by the browser in a special way so that it remains visible regardless of user actions such as scrolling or resizing of

20 a primary Web page frame. The designation information can also be sent down to the browser on a separate download channel.

For example, the designation information can be inserted into an image source tag. An example of an image

25 source tag is as follows:

```
<img src="/images/v6/odot.gif" width="10" height="20"/>
```

If the image is to be stretched to fit within a white

30 space, the designation information may be denoted as:

stretchToFit="true".

If the image is to always remain on the screen, the
5   designation information may be denoted as:

alwaysonscreen="true"

If the image is to only remain on the screen for a
10 certain period of time, the designation information may be
denoted as:

timeslice="5"

15   The timeslice designation enables the corresponding
image, i.e., secondary content, to only be on the screen for
the designated amount of time. After the designated time
period is over, the browser would no longer look for white
space to display the secondary content. Alternatively, this
20 timeslice designation also allows other images, i.e., other
secondary content, to be designated for a certain period of
time. As such, the same available white space can be used
to cycle through, or rotate or alternate, several different
sources of secondary content.
25   As such, the above designations can be inserted into
the image source tag as follows:

```
<img src="/images/v6/odot.gif" stretchToFit="true"
alwaysonscreen="true" timeslice="5" width="10" height="20"/>
```
30

It should be noted that the designation information
can be used on any type of tag, not just image source tags.

The above changes in tag content would require a change
in the HTML standard. Alternatively, instead of embedding
5 the above designation information in tags, the designation
information can be put into a database utilized by the
viewer program where the fully qualified URL to the image
source is the key and the designation information is the
data. Still yet, the designation information could also be
10 placed in meta tags as meta data.

In a preferred embodiment of the present invention, a
new application programming interface (API) in the document
object model for determining a white space hole in a Web
15 page document is provided. The API architecture of the
present invention provides new capabilities to programs. A
new application programming interface (API) enables
application programs and programming scripts to determine
size and location of white space areas in a Web page. More
20 specifically, application programs and programming scripts
can request a white space of a given size within the Web
page document. The browser will either return a list of
white space areas matching the requested white space size;
or, if there are not any white spaces matching the requested
25 size, the program can request that a white space of a given
size be created. In response to the request, the browser
will reflow the Web page document until the requested white
space size has been generated. As such, the Web page
document is edited automatically on the fly using the
30 document object model as provided by a browser or a document

viewer. Images and text in a document are automatically
moved around in order to generate more white space of a
given size or to identify a location of the white space.
Furthermore the browser ensures that certain attributes as
5 specified by the document owner or customer are provided for
in the Web page.

For example, an enterprise's Web page may contain the
company's logo. The Web page owner, i.e., the enterprise,
may specify that the company's logo always remain visible on
10 the Web page regardless of how the Web page is scrolled or
sized. Consequently, not only will the logo always be
visible to the user; but if a user requests a print screen,
the company logo will always appear on the printout.
Likewise, an object area that is to be provided as
15 advertising space can be associated with attributes that
designate the object space as an area that is always to
remain visible. As such, whatever advertisement is
retrieved for that object space will remain visible. The
user will not be able to scroll the advertisement off of the
20 screen. Likewise, there is no need for the browser to pop
up additional frames containing the advertisement or similar
advertisements since the advertisement will remain viewable.
The advertisement remains visible by relocating to other
preexisting white space of by having the browser reflow the
25 content of the document to create white space for the
advertisement.

The present invention can be implemented in a Web
browser, a document viewer, or a plug-in installed on the
browser and executed against the docoument object model on
30 the fly, i.e., in real time as the content is being rendered

on the screen. Alternatively, every Web page can have a DOM white space installer.

Alternatively, the present invention can be implemented in a server where the rendering and layout takes place on a
5 remote box and the finally rendered document is sent to the display of the client. This alternative implementation would be advantageous when, for example, the client is a personal digital assistant or other hand held device.

An instantiation of the invention enables a user to
10 receive information (such as advertisements, stock quotes, personalized financial reports, news updates, or other information) persistently inside the primary document without obscuring the content of the rendered document. The information is persistent in the primary document regardless
15 of whether or not the primary document is being scrolled or the frame containing the primary document is being resized. As a result, no annoying frames need to keep popping up at a user in order to keep such information in front of the user.

20 It is intended that the scope of the invention be limited not by this detailed description, but rather by the claims appended hereto. The above specification, examples and data provide a complete description of the manufacture and use of the system, method, and article of manufacture,
25 i.e., computer program product, of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.

Having thus described the invention, what we claim as new and desire to secure by Letters Patent is set forth in the following claims.